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HOSPITAL CONSTRUCTION,

BY

EDWARD HUTCHINSON, M. D.

To the State Board of Charities :

Gentlemen — The subject of hospital construction has engaged the attention of philanthropists for years, but never, perhaps, with more earnestness than at the present time. The statistics of the old time hospitals of the larger cities on the continent have given such alarming death rates from diseases not frequently met with in private practice, that every exertion has been made to ascertain what have been the causes of the mortality.

No one has done more to show the evil results of over-crowding as affecting the surgical cases, and to call attention to the saving of life which could and should be made by those having under their control the construction of establishments for the sick, than Sir James Y. Simpson, of noble memory. Miss Florence Nightingale has spent her life investigating the causes of the excessive mortality in great hospitals, and has written most ably in behalf of enlightened management in the conduct of these institutions. Sanitarians everywhere have made a study of the means best adapted to insure the welfare of invalids, and to give them the best chances for recovery. All are agreed that solid hospitals of two, three and four stories, with their layers of sick, are bad, and some have even questioned whether it would not be better to keep invalids at home even with all the inconvenience and hardship to result from such a course, than to invite death by exposing them to the dangers of hospitalism.

Under the wise administration of the Army Medical Bureau during our late war, the fact was soon ascertained that both sick and wounded men recovered sooner in tents, and with less average mortality, than in old-fashioned hospitals. When it became necessary to construct large permanent hospitals in the rear, the tent or pavilion plan was the one adopted. This showed great wisdom, and the saving of life in consequence was immense. The Germans were quick to take advantage of the experience we had to offer, and built pavilion hospitals for the wounded of both sides, in the war of 1866, and also in the late war of 1871. By having the wounded and sick in open tents or light wooden structures, located in airy positions with plenty of sunshine and ventilation, the results were surprising. Erysipelas and pyaemia with hospital gangrene became rare, and when these dreadful diseases did break out, the infection was less apt to spread. In the southern states too, the confederates

did not fail to see the advantages of this method, and in Atlanta, Ga., and Raleigh, N. C., their admirable pavilions were models of neatness and convenience. In Dresden, Leipzig, Ghent and Berlin there are fine one storied pavilion hospitals; but in this country, so far as I am aware, there has been no considerable attempt to make them permanent.

The objects of a good hospital may be briefly described:—To care for the sick better than they can be provided for in their own homes: to cure sick people at the least expense: to have a convenient administration so that a few physicians and nurses can do the work: to give those suffering from surgical operations the best chances for recovery with life and limb: to care for the poor who cannot afford the things necessary for their own comfort: that child-bed cases may be kept secluded and not exposed to dangerous influences by contagion, whether by physician, nurses or location: to have provision for the contagious diseases of childhood as well as for those of adult life, so that the mortality may not be increased by the aggregation of the sick.

In regard to the general construction of a hospital, the following points may help to guide us.

Arrange the wards so that no sick person will endanger the life of another.

Have a plentiful supply of pure air, with provision for the escape of the foul air.

Supply at least 1,200 cubic feet of air to each bed.

Separate the sexes, and also medical, surgical and child-bed cases.

Make provision for isolating contagious diseases.

Have a bountiful supply of pure water.

Have all the drains go entirely outside of the buildings.

The wards should be so arranged, that they may have the greatest possible exposure to the sun.

Separate the convalescents from those confined to bed—during the day at least.

Have the wards on one floor, and but one story high.

Delirium tremens, accident and insane patients should have apartments at such a distance from the wards that they may not disturb the rest of the sick.

There should be small wards to isolate troublesome patients, and for those who are easily disturbed.

The kitchen and laundry should be separate from the wards, so that the odors of washing and cooking cannot reach the sick.

Water-closets and slop-sinks should be away from the wards, and have separate ventilation.

The nurses' room should overlook the ward.

There should also be a high and airy situation ; a cheerful view ; in-door promenades ; extensive ground for exercise ; flower gardens and lawn.

Have no cellars under the wards.

Have hard, unabsorbing surfaces for walls and ceilings.

Let the floors be oiled or painted, so that they will not absorb water.

The wards should be so far distant from each other that the air may circulate freely.

The corridors connecting the wards to be open beneath, and provided with glass windows to slide open, to allow the air to blow under and through them.

Have fire-places in the wards to assist ventilation, and to supplement the heating apparatus.

Have *two* steam boilers for fear of accident.

The administration building ought to be distinct from, yet attached to, the wards.

The heating, washing, drying and cooking should be done by steam.

Have such an arrangement of the wards that any one of them can be disinfected, or even torn down, without disturbing the general administration.

The trustees of St. Elizabeth's Hospital, Utica, in order to accommodate the increasing number of patients who apply for admission, have had under consideration, for a long time, plans for a new hospital. These are now submitted for your suggestions, with the hope that whatever is good in them may be of service to others, and that you will point out any defects or omissions, in order that they may be corrected. The architect, Mr. Wm. H. Hamilton, of Utica, is deserving of the highest praise for his intelligent aid and valuable labors. To him the trustees desire to express their thanks, and also to acknowledge their obligation to Dr. John P. Gray, of the State Lunatic Asylum, for having interested himself from the first in perfecting the present plan of construction, and for his many suggestions and final approval.

The hospital will be built on the pavilion plan, on high ground, situated in the eastern part of the city. Its general appearance is shown by the engraving at the beginning of this article. The central building is designed to contain the rooms for general adminis-

tration, dispensary, parlors, office, library, operating-room, and apartments for the religious order which has control of the institution. In the basement will be the porter's room, and the small wards for delirium tremens and insane patients, and accident cases.

The pavilions are arranged on each side of the main building, as shown in the second engraving, and radiate from the circumference of a circle, in such a manner that the end wards will be on a line with the principal structure.

They will be at least thirty feet apart in front, where they are nearest together, and sixty feet apart in the rear. This will allow of a free circulation of air, will not obstruct the light, and will be sufficient to prevent the spreading of contagious diseases if any should, by accident, be received. They will be connected with each other and with the administration building by glass corridors twelve feet wide and ten feet high. These are entirely open beneath, and have flat roofs which are guarded, front and rear, by railings to protect those who wish to sit in the open air. The fronts of the pavilions have large bay windows in order that the convalescents may enjoy the lovely view of the Deerfield hills and Mohawk valley. The front of each pavilion will be two stories high and may be called the administration end. This will contain, on the first floor, the extra diet kitchen, dining room for convalescents, the linen room, the trunk room for patients' clothing, a nurses' room overlooking the ward, and bath rooms and water closets. In front is a large hall for exercise and recreation. Up stairs, are rooms for reading, sewing and amusement. It is intended that patients who are able to leave the wards during the day shall pass most of their time here, and not in the wards. The third engraving will give an accurate idea of the first floor of a ward pavilion.

Back of the administration end is the ward proper. This is one story high and intended to contain 20 beds. It is 80 feet long, 26 feet wide and 16 feet high, giving 33,280 cubic feet in all, or 1,664 cubic feet of air for each patient, and 104 square feet for each bed. The southern end of the ward will be inclosed with glass, like a conservatory, so that the sick may have the benefit of sun baths, and it may, if desirable, be ornamented with flowers.

The windows reach from floor to ceiling, and are so arranged as to have two beds between them. The sunlight will be admitted freely.

The floors will be made of narrow hard wood boards, driven together and made water tight. The walls and ceilings will be hard finished and painted with a silicate of soda composition, so that they

may be washed. This will allow the whole surface to be easily cleaned.

It will be observed that the projecting portion of the pavilion inclosing the water closets has a separate tower reaching above the roof, for ventilation. This tower can be removed still further from the hall and made external to the outer wall, but wherever it is, it will be difficult to prevent the odors from escaping into the building. A constant flow of water and daily washing are the best means to keep this department in good sanitary condition.

The pavilions will be constructed of wood with double walls, and the roofs will be covered with slate. The basement walls will be arched in such a manner that while the air will not be confined underneath in warm weather, they may be boarded up, if necessary, in winter.

It will be noticed that if it ever should be desirable, any pavilion can be torn down and rebuilt without interfering with the usefulness of the hospital, and any one could be disinfected, or remain unoccupied any length of time, without the slightest inconvenience.

The buildings at each end are two stories high and divided into double rooms. These are intended for private patients, or for those who require seclusion, such as eye cases, etc.

There is a promenade through the front halls of the pavilions and the corridors, nearly 200 feet long, on each side of the center building. On the main floor this is under cover, and above, on top of the corridors, the patients may sit in the open air in pleasant weather.

The kitchen, laundry, engine and coal rooms, with the servants' quarters, will be in a pavilion in the rear of the main building. The odor of the cooking and washing cannot reach the sick.

The drains will all be outside of, and not run underneath, any of the buildings.

The engine-room, in the rear, will contain the steam-boilers, and from them the pipes will lead right and left to the pavilions through the corridors. In the center there will be two stacks, or coils, which will warm the fresh air as it comes through the air-boxes from outside, as shown in the fourth engraving. These air-boxes are placed under the floors, and open on each side of the ward. Valves will be so arranged that the supply may be regulated at pleasure. This will be supplemented by suitably arranged pipes or coils so placed as to give direct radiation. The heating will thus be by indirect or direct radiation, either one or both, according to the severity of the weather. The stacks of steam-pipes in the center of each ward will

be so large, that except in the coldest weather, they will be expected to heat enough fresh air to keep a large and constant supply continually in circulation.

The method of ventilation may be understood by referring to the fourth engraving. The fresh air will enter through the floors of the wards from the air-boxes beneath, and after being heated by the large coils will ascend to the ceiling. The ventilating flues, shown at each side of the ward, are to be of glazed tile, and they will rise from floor to ceiling near the walls, but not be in contact with them. The foul air will enter at the floor and pass through the warmed tile-pipes to the attic, and thence out through the escape-flues in the roof. These outside ventilators will be of the same height in all the pavilions, so there can be no downward currents. There will be ten columns in each ward, one between every two beds.

In the present hospital, this system of fresh-air supply, steam coil heaters, inside warm ventilating-flues, with openings at the floor, and ridge escape-ventilators in the roof, is in full and perfect operation. Practically, the air is constantly changing in every ward, foul and hospital odors cannot be detected, and the atmosphere is far purer than in most private residences.

Provision is made for summer ventilation, in the new hospital, by opening large circular ventilators in each ceiling, and, with open windows, there will be a constant change of air.

Double fire places will be provided in case any temporary accident should befall the steam apparatus.

Speaking-tubes will connect each department with the central office.

The water supply will be independent.

The lying-in ward will have a portion set aside by partition, as shown in the third engraving, No. 6, for a delivery ward. Should child-bed fever occur, the other patients could be easily moved into another pavilion.

Children attacked with contagious diseases may be best cared for in some of the upper rooms, away from the lying-in ward.

A small cottage will be built in one corner of the grounds for any contagious disease requiring complete isolation.

Thorough cleanliness, abundance of sunlight and fresh air, and, if necessary, isolation, will render it difficult for any disease to spread from one patient to another.

The whole hospital will face toward the north, where the view is exceedingly beautiful. The rear wards spread toward the south, and thus will be exposed to the sun all the day long.

Wire or gauze screens will be placed inside of the windows so that while patients may look out, they cannot see the sick in the neighboring wards.

The vegetables will be kept in the outbuildings and not under the wards.

The dead house and burial chapel will be in the rear.

The great chimney will have an iron smoke pipe in its center reaching to the top. Around this pipe a column of warm air will be constantly ascending, and into this space will be conveyed the ventilating flues from the wash house, soiled-linen room and kitchen.

To prevent the sewage gases from entering the buildings, there will be a small ventilation pipe from each drain outside the walls, reaching up above the roofs. This will give an outlet for the backward currents of sewer gas, so that the water valves in the traps may be effectual.

One objection that might be suggested to the pavilion hospital just described, is that it occupies too much ground. To this it may be replied that it is far better for the sick to be away from the center of a town; and on the outskirts of most cities, land may be easily secured without great expense.

Whether the pavilions are far enough apart might be a question; however, by this arrangement, the sick will be separated from forty to sixty feet across the open spaces, and between the nearest beds at least ninety feet will intervene through the halls and corridor.

In Captain Galton's model ward, in the great Herbert hospital at Woolwich, and in many of the latest English hospitals, the water closets and baths are at the free ends of the wards. This arrangement has its advantages, but it cuts off the sunlight. In the plan under consideration, the ends of the wards project to the south and are inclosed with glass. The closets are toward the corridors but have distinct ventilation and are besides cut off from direct communication with the sick as completely as in the English method.

It has been strongly urged by Florence Nightingale that there should be no rooms for convalescent patients to sit in during the day, as they are apt to become unruly. To this it may be urged, that it is better to keep invalids in the hospital and under treatment, than to allow them to be exposed too soon. It is true that the sick are cheered by the sight of the convalescent, but it is also true that the very sick are greatly annoyed by the ordinary occupations of those who are nearly well. However, there is space enough for either method.

It may be said that it will be impossible to heat such an extensive series of buildings by steam in such a cold climate as we have in this section of the State. All experience in our State lunatic asylum and cotton and woolen mills goes to the contrary, and with double windows it is proved not only possible but easy.

The frontage will be 550 feet, and the depth 225 feet.

The cottage pavilions at each end will contain 52 beds, and the four open wards 80 beds, making a total of 132 beds. To these may be added 24 more, which could be used in case of need, in the upper rooms in the front of each pavilion, making a total of 156 beds. This is exclusive of those in the rooms in the main building, and in the servants' quarters in the rear.

The architect's estimate of the cost of the whole structure, including steam apparatus, is \$75,000, or less than \$500 per bed. This is on the supposition that the central building be of brick and the pavilions of wood. Whether these estimates are correct can only be ascertained after the hospital shall have been completed, and unfortunately, the trustees have not yet been able to secure the necessary funds — which, however, they hope to accomplish.

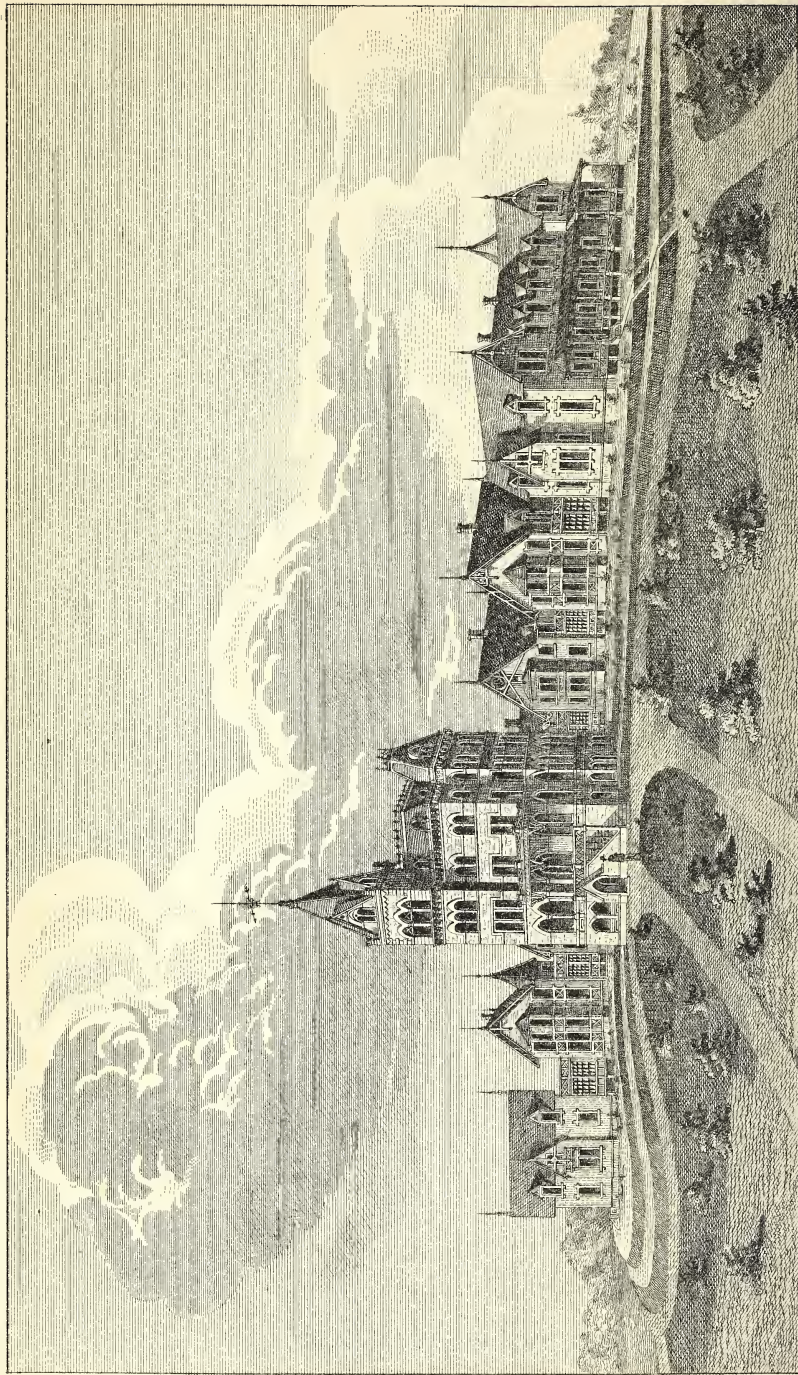
Trusting that this brief contribution to the subject of hospital construction may meet with your approval, and thus lead to the building of institutions on this or some similar plan; I remain with great respect,

Your obedient servant,

EDWIN HUTCHINSON, M. D.

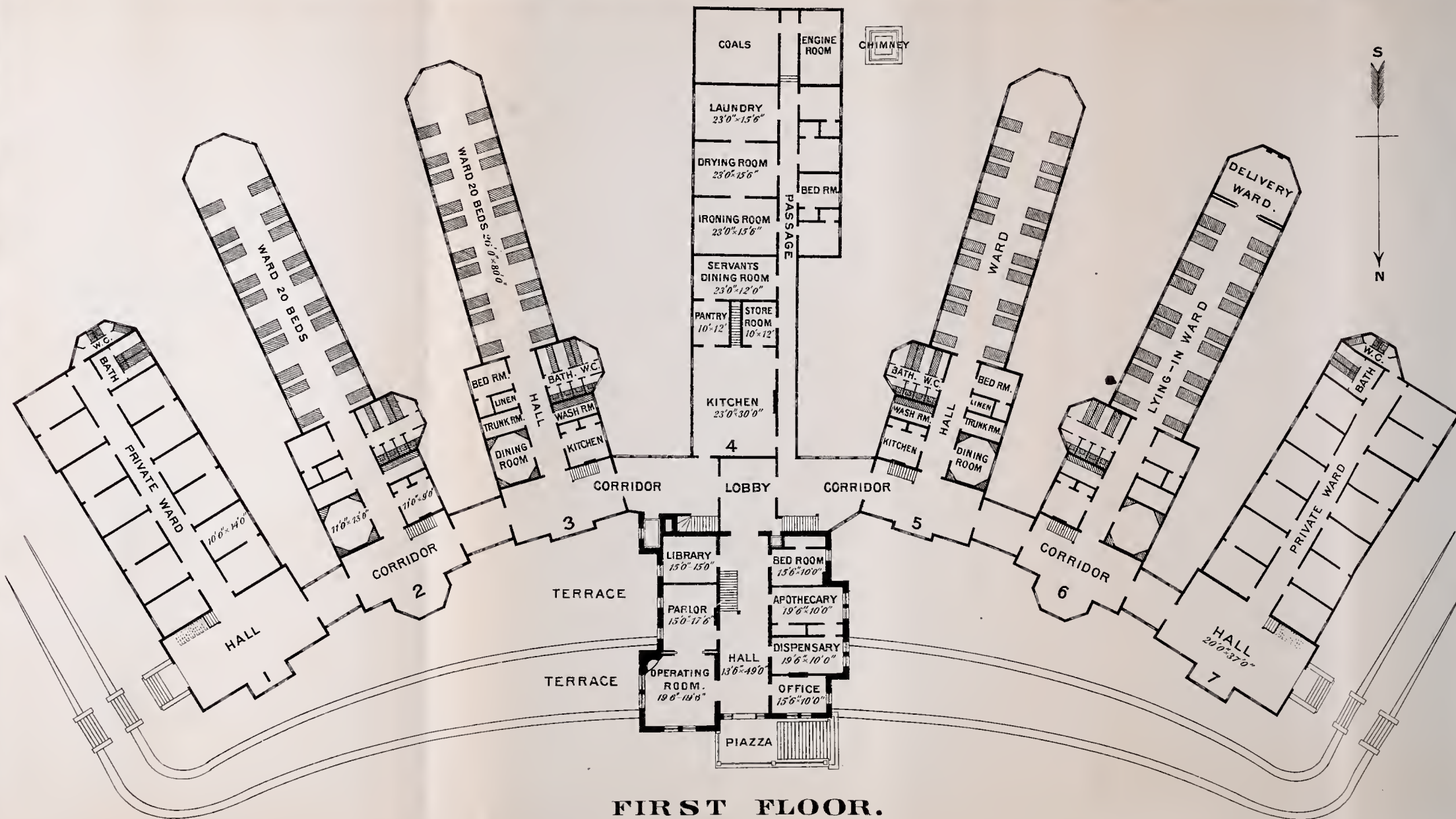
Surgeon-in-charge, St. Elizabeth's Hospital.

UTICA, N. Y., *January 1, 1875.*

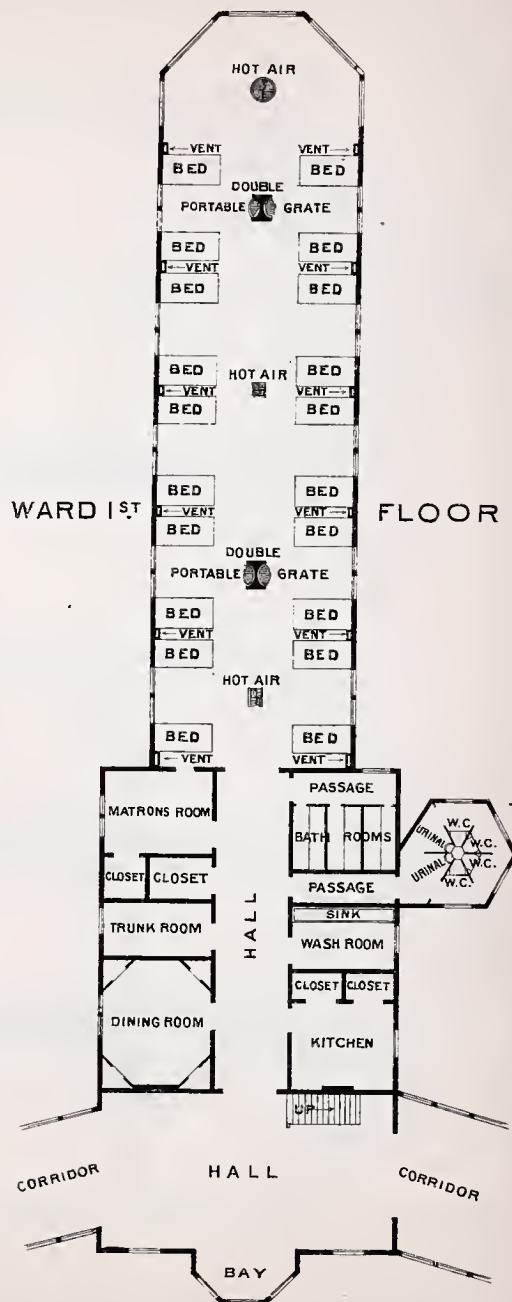


Lith. by Weed, Parsons & Co Albany N.Y.

ST. ELIZABETH'S HOSPITAL, UTICA, N. Y.



FIRST FLOOR.



WARD 2ND FLOOR

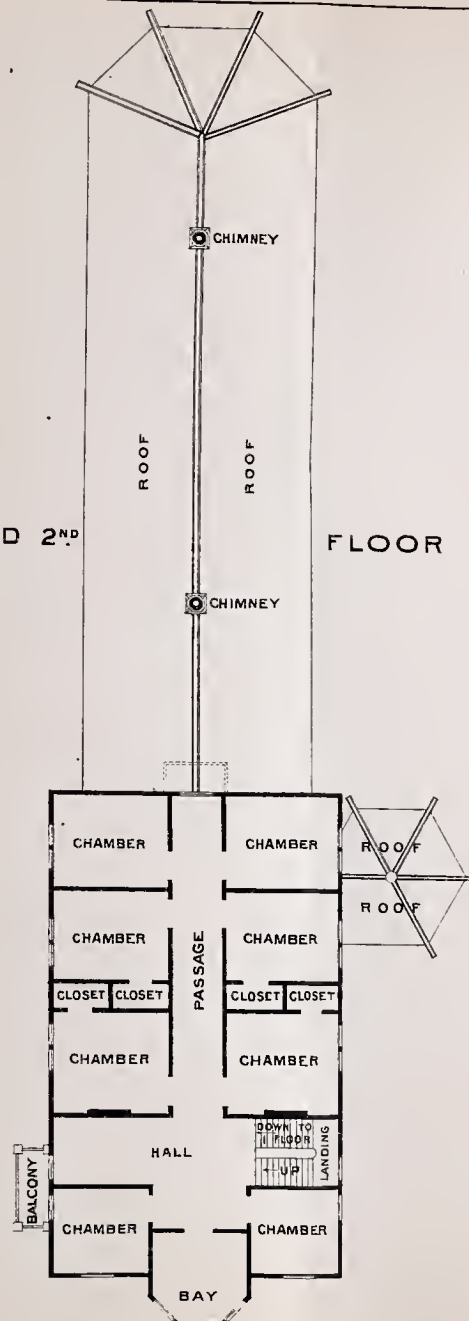


PLATE 4 N^o 1.

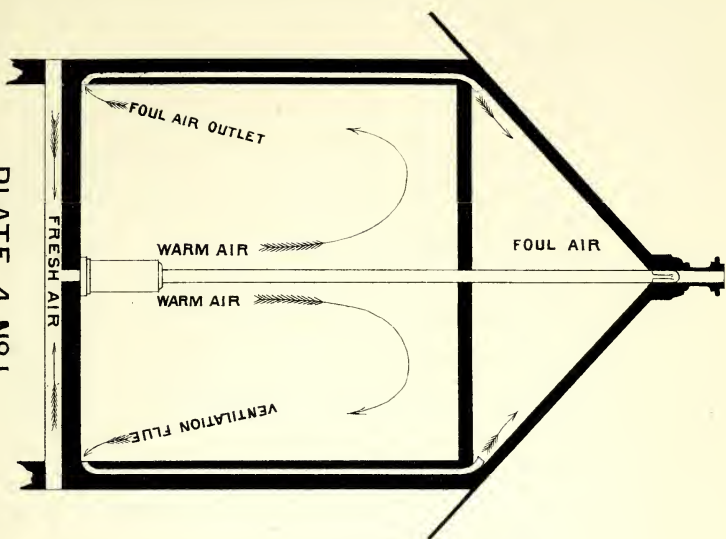
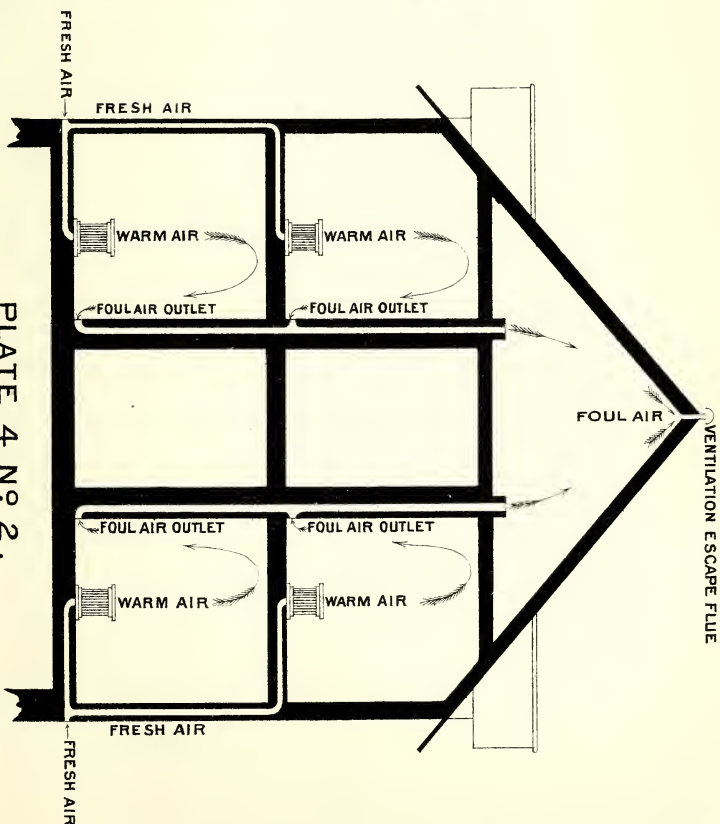
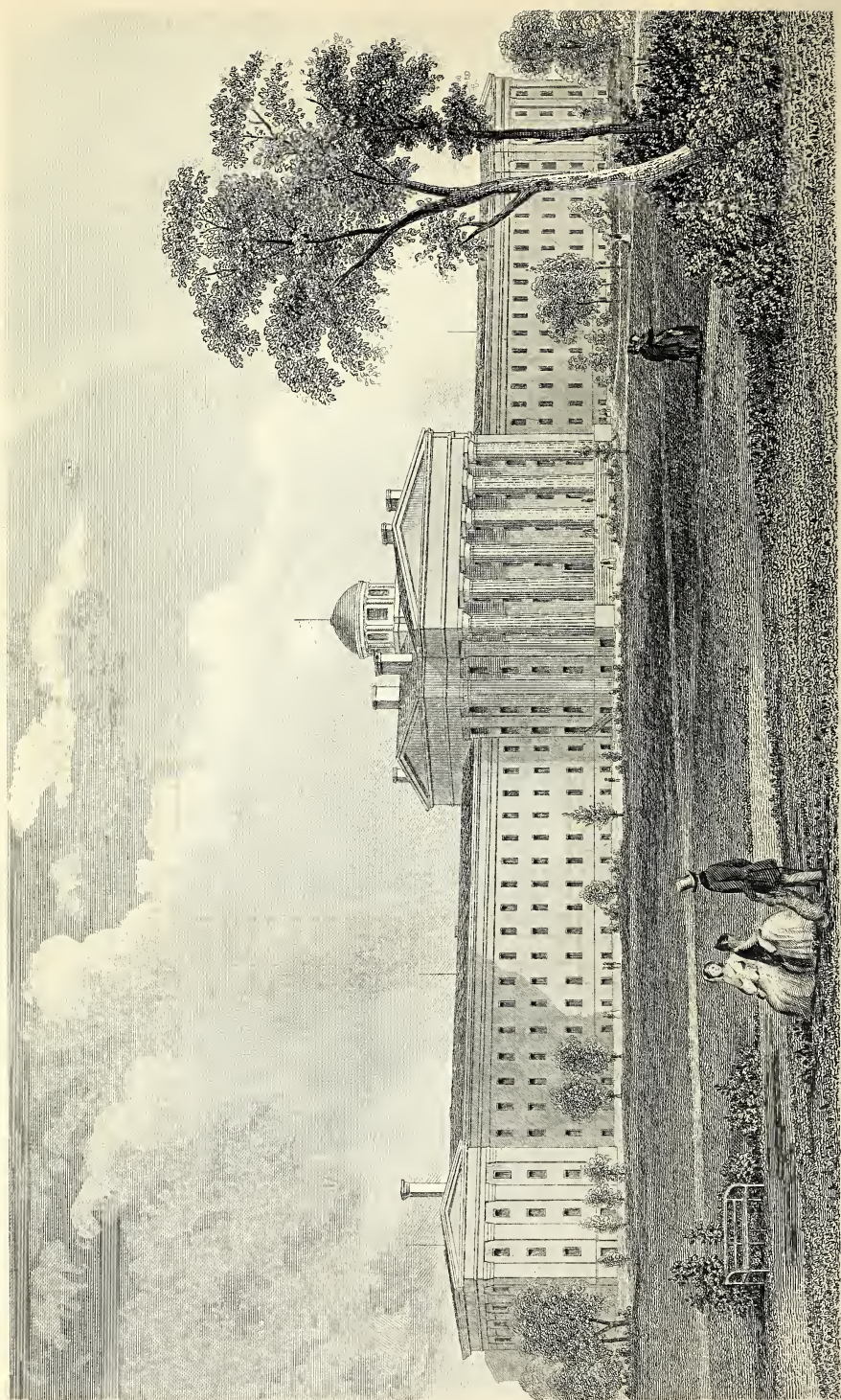
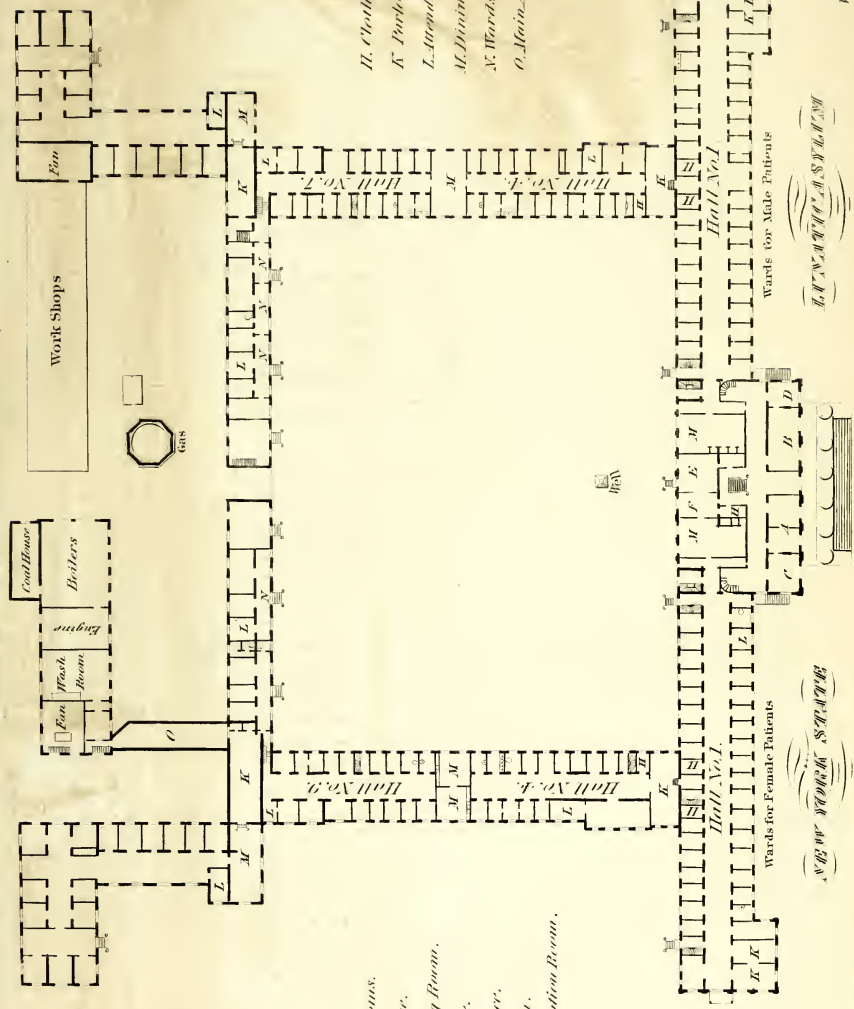


PLATE 4 N^o 2.









A. Reception Rooms.
B. General Office.
C. Officers Dining Room.
D. Private Office.
E. Stenographers Office.
F. Matrons Room.
G. Female Reception Room.

H. Clothes Room.
K. Porters & Day Rooms.
L. Attendants Rooms.
M. Dining Rooms.
N. Wards for the sick.
O. Main-Entrance Passage.

